adopted which aims first to secure a good system of education and regards a small increase of the rates as a secondary consideration.

Readers of NATURE do not need to be reminded of the paramount importance of improving and completing the facilities for higher technical and for university education in London. As Sir Michael Foster said in the House of Commons, during the second reading debate on the Education Act of 1903, the new education committee and the reconstituted University of London must work together for the better education of the people of London, and the new committee must be interested in university as well as in secondary and elementary education. If, as the chairman of the General Purposes Committee remarked on proposing the adoption of the scheme outlined above, "the Education Act has any merit, it is that it co-ordinates the whole of the work of education in London." This being so, the University of London must be regarded as the necessary complement of any system of primary and secondary education in London, and the work of the University on one hand and of the schools on the other must be fashioned so that one completes what the other has appropriately prepared. To ensure this the new committee should in its deliberations be assisted by broad-minded men familiar with the work and aspirations both of the schools and of the University, and the ordinary councillor, appointed to perform a variety of administrative duties, cannot be expected to possess the necessary knowledge and experience.

The Acts to be administered clearly specify that "the local education authority shall consider the educational needs of their area and take such steps as seem to them desirable, after consultation with the Board of Education, to supply or aid the supply of education *other than elementary*, and to promote the general co-ordination of all forms of education," and "education other than elementary" includes not only secondary but technical and university education. It is unnecessary to point out—it has been so often done in these columns—that to aid higher education is by no means to interfere with its administration. Higher education is a matter of national importance, and is properly governed only by men with special training and varied experience. Though it would be a misfortune for any education committee to hamper the work of, say, a senate of a university by unintelligent and unnecessary dictation, it should be the aim of every such authority to encourage, assist and advance university work by every means in its power, and this can alone be effected by the presence at its meetings of expert members.

In July last we described proposals made by Lord Rosebery in a letter to the chairman of the London County Council for the establishment of a great institute of technology in London, and in a subsequent issue we recorded the fact that the Council had, in certain circumstances, agreed to provide some 20,000*l*. a year towards the maintenance of the educational work of such an institute. In view of such an arrangement as this it is surely desirable that there should be upon the new education committee some members at least fully conversant with university and higher technical education, even on such low grounds as to ensure that the Council obtains a due return for its public-spirited policy. So, if it were necessary, other instances of the practical importance of including representative persons with special qualifications upon the new committee could be given. The fact is there seems to be an ingrained dislike in this country to make use of experts. While abroad the opinions of great men of science are, even in national councils, treated with honour and respect, with us they are more or less ignored, and the example set in high places is followed by authorities of local importance only.

The London County Council is face to face with an opportunity, pregnant with possibilities, for equipping London educationally in a manner befitting the capital of a great Empire. But there is grave danger that the opportunity may be missed, and that London may continue ill-provided with facilities for the instruction of its sons and daughters in a manner to enable them properly to fulfil their destiny. So vital to our national welfare is this question of levelling up London's education that we can afford to neglect no means to ensure success; and to pass over and ignore completely the experience of those whose lives have been spent in studying educational and scientific requirements is a suicidal policy which we trust the good offices of the Board of Education will serve to avert.

SLEEPING SICKNESS.

SLEEPING SICKNESS, or African lethargy, is a disease the history of which we can trace back no further than 100 years. The first description that we know of is that of Winterbottom, who, writing of Sierra Leone in 1803, said: "The Africans are very subject to a species of lethargy which they are much afraid of, as it proves fatal in every instance." The disease has been met with along the whole of the west coast of Africa from the mouth of the Senegal to as far south as S. Paolo de Loanda. Cases have also occurred in the French Antilles, due to importation of African natives. To what extent it prevailed along the west coast of Africa in bygone days it is now impossible to say, but even at the present time many of the French possessions are perhaps as seriously affected as Uganda now is.

It exists also in the Congo basin, but probably not at all to the same extent as at present in Uganda. Regarding its distribution and its epidemic outbursts we require further information. Leaving aside these questions, it may be well to describe first the disease itself. Of its incubation period, eight to eighteen months are possible limits, but on this point also our knowledge is deficient. For convenience sake the progress of the disease is generally divided into three stages.

First stage:—The most characteristic sign that a patient has contracted the disease is a change in the facial expression. The intelligent aspect of the healthy native is replaced by a dulness, a heaviness, an expression of apathy which makes it easy to pick out the sufferer. If examined more closely the temperature may be found to be raised, and the patient may complain of headache, of indefinite pains in the body, especially over the chest.

Second stage:—The dulness of expression deepens, the gait of the patient attracts attention, it is shuffling. When spoken to the patient replies with slow, thick, mumbling speech. His tongue trembles, and a shakiness appears in the hands. The face is puffy and saliva may dribble from the mouth. The pulse is quickened, the temperature is raised. The patient sits about listlessly and is more and more disinclined for exertion. He speaks only if spoken to, then he nods and becomes drowsy again, passing gradually into the

Third stage:—All the signs are now well marked. The patient is in a state of almost complete somnolence. He lies helpless on his mat, oblivious of all around him, with filthy ulcers covering his emaciated body; thus the unfortunate being passes into a condition of complete coma—and death.

The whole course of the disease may last six months, often only two or three, and seldom twelve, and it is as

true to-day as when Winterbottom wrote 100 years ago that it proves fatal in every instance. What, then, is the cause of this fatal disease? In order to appreciate fully the recent discovery of its nature it will be necessary to recall to our mind what we know of the nature of some other well-known diseases. Those who are at all familiar with works of travel on Africa will have read of the tsetse fly and the tsetse-fly disease in

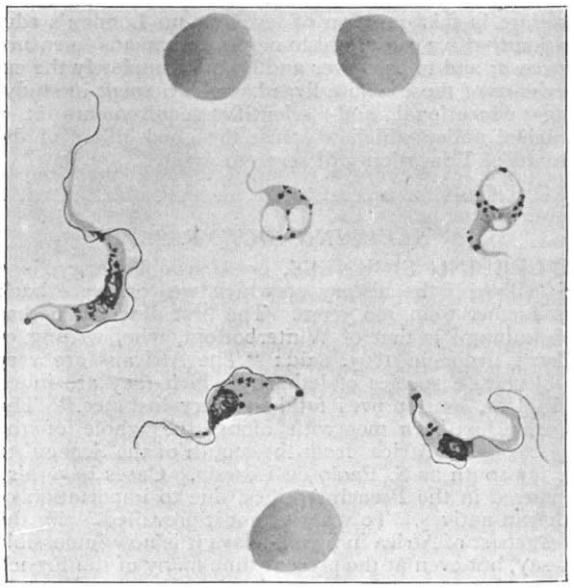

FIG. 1.

cattle—ngana. Travellers well know the danger to their cattle and horses of the "tsetse-fly belt," and various devices have been employed to escape the deadly bite of the fly, such as smearing the animals with dung and passing through "the belt" at night, when the flies, as a rule, do not bite, or even covering the horses with a suit of clothes.

The deadly fly disease ngana was first elucidated by Col. Bruce, R.A.M.C., F.R.S., who proved that the disease was due, not to a poison injected by the fly, as Livingstone had supposed, but to a living organism, microscopic in dimensions, worm-like in aspect, moving about in the blood. This organism—a trypanosome—the tsetse fly introduces into the blood at the time of biting. It should be clearly understood, moreover, that the fly derives this trypanosome, not from water, not from decomposing matter, but solely from the blood of another animal containing these trypanosomes. The disease is, in fact, contagious just as malaria is, and in this case also the contagion (the trypanosome) is transmitted, not by contact of the healthy with unhealthy animals, but only through the agency of a fly.

"Ngana," then, is a disease in cattle caused by a trypanosome. "Surra," a somewhat similar disease well known in India, is also caused by a trypanosome, likewise mal de Caderas in South America. These are diseases affecting animals, but in 1902 Dutton, who was working in Gambia, found for the first time a trypanosome in man (a European). This, too, was the cause of a fatal disease, for the patient died in Liverpool about a year later.

Trypanosomes, then, are the cause of fatal diseases in animals, and even in man, and in one of these—ngana—the mode of infection is by the bite of a tsetse fly. Let us now turn to recent discoveries in sleeping sickness.

In November, 1902, Castellani, in Uganda, examining the cerebro-spinal fluid of a case of sleeping sickness, found a trypanosome. Bruce and Nabarro, who arrived in Uganda in March, 1903, were struck with the importance of this discovery and forthwith took up energetically an examination of the disease in this direction, with the result that they found trypanosomes in the cerebro-spinal fluid of all cases examined by them, and, moreover, they also found them in the blood. Now in all experimental work, results are frequently almost valueless unless control experiments are made. Consequently it was next established that the cerebro-spinal fluid of those not suffering from the disease did *not* contain trypanosomes. But although the blood of patients suffering from sleeping sickness contains trypanosomes, yet they are present also in the blood (in 28·7 per cent. of the population) of natives in the sleeping sickness areas, *but not outside* these areas; a very important fact and one which might well have escaped detection had not the control experiments been made. To discuss completely this fact would take us too far, and indeed our knowledge is still incomplete on this point. Suffice it to say that the existence of trypanosomes among the natives (not suffering from sleeping sickness) indicates cases of "trypanosome fever," which we have seen has been known since Dutton's discovery in Gambia and which now we know to be a common disease among natives in certain regions, *e.g.* the Congo. Bruce and Nabarro, however, believe that these cases of trypanosome fever are initial cases of sleeping sickness. So long as the trypanosome is confined to the blood we have simply "trypanosome fever," but when the trypanosome gains an entry into the cerebro-spinal fluid, then the case becomes one of sleeping sickness with the characteristic symptoms. The commissioners concluded, in fact, that sleeping sickness was due to the trypanosome.

Now as ngana, a trypanosome disease, is transmitted by a tsetse fly, the question naturally arose, could this be established for sleeping sickness? In the first place a search was made for tsetse flies; they were easily found. In the next place, by a systematic collection of biting flies of all kinds from the district, it was found that the distribution of the disease and that of a certain species of tsetse fly was practically identical. In

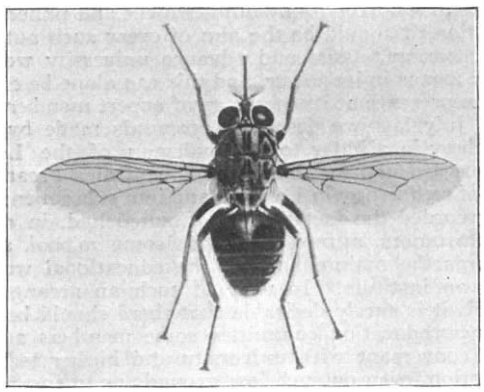

FIG. 2.

fact, the tsetse fly involved (*Glossina palpalis*) is, like sleeping sickness, practically confined to the shores of Victoria Nyanza and the islands. This, then, was an important confirmation of the trypanosome nature of the disease. Further, also, it was proved by experiment that the fly could transmit the trypanosome from the unhealthy (sleeping sickness patient) to the healthy (monkey), and the monkeys succumbed, with symp-

toms, so far as it is possible to judge. resembling those in man, at any rate with identical changes found in the brain after death. The problem of the nature of the disease was thus solved in a very short space of time by this brilliant piece of work.

Of the treatment of sleeping sickness there is nothing to be said. No drug or other mode of treatment has any effect; the disease is always fatal. It is possible that in prevention more hope may be put; for the tsetse flies frequent thick jungle and shun open ground. A complete study of their habits will be necessary before one can express a definite opinion; but here, as in the problem of mosquito extermination, the task will probably be no easy one.

The illustrations represent (Fig. 1) trypanosomes from a case of sleeping sickness, after Bruce; (Fig. 2) a tsetse fly (*Glossina palpalis*) × 3, after Austen.

J. W. W. STEPHENS.

RADIO-TELLURIUM.

ACCORDING to a Press account of a recent lecture in Vienna, Prof. Marckwald illustrated in many striking and novel ways the intense activity of the body isolated by him from the Joachimsthal pitchblende and named radio-tellurium. The ionisation of the air in the immediate vicinity of the active substance is so intense that a current sufficiently strong to ring an electric bell was enabled to pass through it, the air forming part of the circuit. If a sheet of paper is interposed to screen the air from the rays of the preparation the effect ceases immediately and the bell stops ringing. Leyden jars were discharged without sparking by the substance, and other evidences of its great discharging power shown. All these effects were produced by a few hundredths of a milligram of the substance. Even the most active preparations of radio-tellurium, it is stated, are not self-luminous.

Prof. Marckwald obtained less than four milligrams of his substance from two tons of pitchblende. At first electrolytic methods were employed, but afterwards it was found that the active substance is completely deposited on a plate of bismuth or copper immersed for some days in the solution. The actual deposit consists almost entirely of ordinary tellurium, which possesses the power, so common in similar cases, of carrying down with it during the deposition the minute trace of active matter which is responsible for the radio-activity. The active constituent is separated from the tellurium by precipitating the solution with hydrazin hydrate. The tellurium precipitated is inactive, and the new body remains in the solution.

Prof. Marckwald is, however, alone in considering it to be a new substance. The radiations from it consist only of the α or non-penetrating variety, and this is the characteristic feature of polonium, discovered by Mme. Curie, who has protested against the name radio-tellurium being given to the body described by Prof. Marckwald. The activity of polonium, however, gradually decays, diminishing to half-value in about a year, whereas Prof. Marckwald states that the activity of his body is permanent. He also states, however, that the α radiation of the body is so powerful that he obtained sufficient light by the impact of the rays on a screen of phosphorescent zinc sulphide to be plainly visible to an audience of several hundred people. These two statements seem to be physically irreconcilable according to our present knowledge of the nature of the α rays, and it is to be hoped that Prof. Marckwald will give some account of the measurements by which he has concluded that the activity of radio-tellurium is permanent. Without in any way detracting from the merit of his splendid researches on the nature of the active substance, most men of science will agree with Mme. Curie in protesting against a new name being given to it in the present state of our knowledge. The practice of rechristening well-known bodies and sending them back to the country of their origin with new names and as new discoveries, which seems to be prevalent among some German organic chemists, would, if adopted in the case of the radio-active bodies, lead to the recognised number being exactly doubled.

FREDERICK SODDY.

NOTES.

THE article on the new education authority for London, which we print elsewhere in this issue, directs attention to a matter of vital importance to the educational interests of London. The County Council has approved a scheme by which the Education Committee concerned with the whole of the work of secondary education in London is to be made up practically of county councillors, without any persons possessing expert knowledge of science, art, literature, or education upon it, selected from outside the council. This committee, if approved by the Board of Education, would differ from the educational authorities appointed by county councils in most parts of the country, and appears contrary to the intentions of the Act under which it is constituted. Doubtless expert opinion will be obtained by the council, but the danger is that a committee constituted like that proposed for London may not know when expert guidance is necessary, and can certainly not be in sympathetic touch with all the lines along which educational progress should be made. The only way by which the interests of higher education in London can be satisfactorily represented is by the appointment of persons with special knowledge upon the committee; and by neglecting this factor of success in order to avoid the sectarian difficulty which might be involved in the selection of men and women outside the council to serve upon the committee is in our opinion a serious mistake.

THE gold medal of the Royal Astronomical Society has this year been awarded to Prof. G. E. Hale, director of the Yerkes Observatory, for his method of photographing the solar surface and other astronomical work. The president of the society, Prof. H. H. Turner, will deliver the address at the anniversary meeting on Friday, February 12. The American Ambassador will be present at the meeting, and receive the medal on behalf of Prof. Hale.

THE sudden death of Mr. W. G. McMillan, the secretary of the Institution of Electrical Engineers, announced last week, will be widely regretted. Mr. McMillan was laid up with a chill a short time ago, which developed into an attack of pleurisy, but he seemed to be well on the way to recovery when his sudden death from heart failure took place on January 31. Mr. McMillan, after a distinguished career at King's College, was appointed to a post under the Indian Government as chemist and metallurgist to the Ordnance Factories near Calcutta. This position he held for five years, and on his return to England he was elected to the lectureship in metallurgy at Mason College, Birmingham, which position he held until 1897, when he was appointed secretary of the Institution of Electrical Engineers. Mr. McMillan has written largely on electro-metallurgical subjects, his "Treatise on Electrometallurgy" and his translation of Dr. Borcher's "Electrometallurgy" being the standard English works on this branch; he recently contributed the articles on electrochemistry and electrometallurgy to the new volumes of the